Pondering Parvovirus B19

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Infection with Parvovirus B19 leads to a condition known as Fifth disease. Other names for this condition include: erythema infectiosum, slapped cheek disease, or glove-and-socks syndrome. Parvovirus infection will not cause harm to a pregnant woman or her fetus if the infection is acquired after the 20th week of gestation; however, prior to this time, there is an increased risk of miscarriage and hydrops foetalis. It is for this reason that the parvovirus B19 is our **Bug of the Month**.

What is Parvovirus B19?

Parvovirus B19 is a small DNA virus which was accidentaly discovered in the UK during routine screening of blood donors for the hepatitis B virus. The serial number of the specimen that was positive for parvovirus was B19.

Parvovirus is a single-stranded DNA virus belonging to the virus family *Parvoviridae*, which also includes the animal Parvoviruses (canine parvovirus and feline panleukopenia virus). However, the Parvoviruses are species specific and only Parvovirus B19 is pathogenic in humans.

Parvovirus B19 multiplies rapidly in dividing erythroid progenitor cells and is spread by respiratory droplets. The virus leads to infection after an incubation period of four to 14 days. The period of communicability is deemed to be over once the rash, which is characteristic of the disease, has appeared.

What is Fifth disease?

There are six classic exanthematous diseases that occur in childhood (Table 1). Infection by Parvovirus B19 became known as Fifth disease because it was the fifth cause of superficial red rashes in children to be identified. After the prodromal phase of two weeks, the disease manifests as follows:

- a low-grade fever,
- gastrointestinal upset,
- coryza,
- headache and
- pharyngitis.

The rash stage follows with subsequent symptoms such as:

- a pruritic exanthem in children,
- myalgias and
- arthralgias.

Approximately 15% to 30% of individuals who suffer from Fifth disease will develop erythema infectiosum which results in the characteristic erythematous appearance of the cheeks, resulting in slapped cheek syndrome. This rash is more common in children than in adults and it can spread to the arms, the legs and the trunk. Factors which may enhance the appearance of the rash include sunlight exposure, heat and exercise. The clinical manifestations of erythema infectiosum are more severe in adults than in children.

During outbreaks of Fifth disease, approximately 20% to 30% of adults and children who are infected with Parvovirus B19 do not develop any symptoms and many people who do develop the disease will only suffer from a mild, self-limited, flu-like illness and will recover rapidly.

Adult females can also develop acute, painful and swollen joints, which may persist for several months. Persons with pre-existing immunologic disorders such as AIDS, may develop chronic anemia and may remain infectious for many weeks. Furthermore, a Parvovirus B19 infection may cause temporary bone marrow dysfunction in those with pre-existing hematologic abnormalities such as sickle-cell disease, or hereditary spherocytosis.

Erythema infectiosum is clinically very similar to a rubella infection and the two conditions may only be distinguished

Table 1

Six classic exanthematous diseases in childhood

First disease	Measles (or rubeola)
Second disease	Scarlet fever
Third disease	German measles (rubella)
Fourth disease	Filatov-Dukes disease
Fifth disease	Erythema infectiosum
Sixth disease	Roseola infantum (exanthem subitum)

serologically. However, infection with Parvovirus B19 can be associated with rheumatologic manifestations which can last for months.

What are the complications of Parvovirus B19 infection?

The most common complications of infection with Parvovirus B19 are summarized as follows:

Arthritis: A short-lived, mild arthritis may occur in five per cent to 10% of children. In adults, up to 78% of infected individuals will develop significant joint symptoms with polyarthralgia or polyarthritis, particularly observed in women. Rheumatoid-like joint involvement has been observed in:

- metacarpophalangeal (MCP) joints,
- proximal interphalangeal (PIP) joints,
- knees,
- elbows,
- wrists and
- ankle joints.

The MCP and PIP joints are most commonly affected.

The arthralgia and arthritis usually begins one to three weeks following initial infection and usually improves within two weeks after being exposed. Prolonged arthritis occurs in 10% of cases, may last up to 10 years and is often associated with morning stiffness. Unlike rheumatoid arthritis; however, Parvovirus B19 postinfectious arthritis does not cause permanent damage to bones or joints.

Complications in Pregnancy: As a result of prior exposure, approximately 60% of women are immune to Parvovirus B19. However, if the mother is not immune and she acquires the infection after the 20th week of her pregnancy, there is minimal risk to the fetus. Furthermore, if the infection is acquired before the 20th week of her pregnancy, there is a slightly increased risk of:

- miscarriage
- hydrops fetalis when the fetus develops anemia (3%) and
- high output cardiac failure with associated extramedullary hematopiesis, hepatomegaly and cardiomegaly.

Hydrops fetalis can be diagnosed using ultrasounds and treated by intrauterine blood transfusions.

Currently, strong evidence is lacking to support congenital or developmental abnormalities in a child whose mother acquired the infection during her pregnancy. Therefore, in the case of maternal infection, there is no evidence to suggest that the pregnancy should be terminated.

Aplastic Crisis: Parvovirus B19 can multiply in the red blood cell precursors in the bone marrow of certain high-risk groups leading to transient aplastic crises in those with chronic hemolytic anemias (*e.g.,* sickle cell disease, hereditary spherocytosis and beta thalassemia). Persons who are immunocompromised may be subject to persistent viral replication leading to red cell aplasias and chronic anemia. The people who are at risk are immunocompromised from:

- undergoing chemotherapy for the management of leukemias,
- an organ transplant,
- an infection with HIV, or
- other immunodeficiencies.

How is the infection diagnosed?

Parvovirus B19 infection is often diagnosed clinically. However, in cases of persistent polyarthritis or in pregnancy, serologic analysis for the presence of anti-Parvovirus B19 IgM antibodies can be undertaken. The presence of Parvovirus B19 IgM antibody is consistent with a recent infection; however, the presence of IgG antibody indicates infection in the past and confirms life-long immunity. The absence of either IgG or IgM antibodies suggests that the person remains susceptible to Parvovirus B19.

How is infection prevented and managed?

Frequent hand washing is recommended as an effective method in prevention. Persons who suffer from erythema infectiosum do not need to be isolated because they were contagious before they developed the rash and are no longer infected with the virus by the time the rash presents.

Once infected with Parvovirus B19, the only available therapy for management is relief of symptoms, specifically, relief of pyrexia, joint discomfort or pruritus. Adults with arthritis/arthralgia may be managed through the restriction of activities, rest and the use of non-steroidal anti-inflammatory agents.

Persons with severe anemia caused by Parvovirus B19 may need hospitalization and blood transfusions. For these people, intravenous immunoglobulin therapy may be necessary.

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